

IN THE CLAIMS:

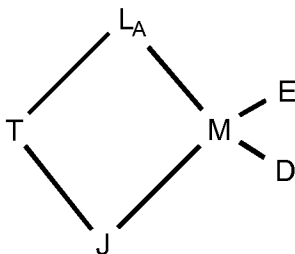
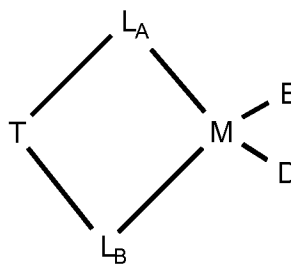
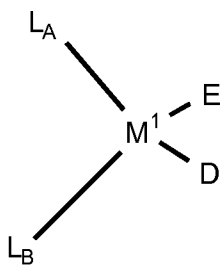
Please amend the claims as follows:

Claims 1-11. (Cancelled).

12. (Previously Presented) The composition of Claim 23 wherein the at least one monomer comprises styrene, vinyl styrene, an alkyl styrene, isobutylene, isoprene, or butadiene.
13. (Original) The composition of Claim 12 wherein the one or more monomers comprise styrene.

Claims 14-22. (Cancelled).

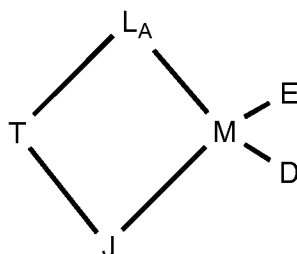
23. (Previously Presented) A composition comprising a bifunctional metallocene catalyst comprising the product of two or more catalyst precursors and at least one monomer, wherein the monomer is polymerizable by free-radical polymerization, and wherein the catalyst precursors are represented by at least one of the formulas:



wherein

- (a) each M is a Group 4 metal;
 each M¹ is Group 4 metal;
- (b) L_A is a substituted, cyclopentadienyl or heterocyclopentadienyl ligand connected to M or M¹ wherein L_A comprises R;
- (c) L_B is a ligand as defined for L_A but selected independently of L_A;
- (d) T is a bridging group that connects L_A and L_B or that connects L_A and J and comprises a Group-13-to-16 element and 0-2 of R';
- (e) D and E are the same or different abstractable ligands, and
- (f) J is a heteroatom ligand comprising a Group-14-15 atom and 0-2 of R",
 wherein each R, R', and R" are independently hydrogen or a hydrocarbyl group provided at least one of R, R', and R" can be polymerized by a free radical initiator, provided that when M¹ is Zr, L_A is substituted at more than one carbon atom, and wherein the two or more catalyst precursors each have a different Group 4 metal.

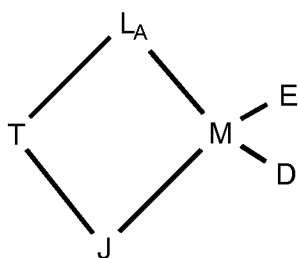
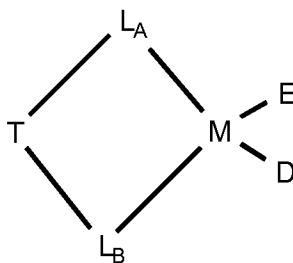
24. (Currently Amended) A composition comprising the product, a catalyst precursor and at least one monomer, wherein the monomer is polymerizable by free-radical polymerization, and wherein the catalyst precursor is represented as follows:



wherein

- (a) M is a Group 4 metal;
- (b) L_A is a substituted or unsubstituted, cyclopentadienyl or heterocyclopentadienyl ligand connected to M, wherein L_A comprises R;
- (c) J is a heteroatom ligand comprising a Group-14-15 atom and 0-2 of R";

- (d) T is a bridging group that connects L_A and $\underline{J}L_B$ and comprises a Group-13-to-16 element and 0-2 of R' ; and
 - (e) D and E are the same or different abstractable ligands,
wherein each R, R' , and R'' are independently hydrogen or a hydrocarbyl group provided at least one of R, R' , and R'' can be polymerized by a free radical initiator.
25. (Previously presented) The composition of Claim 24 wherein the at least one monomer comprises styrene, vinyl styrene, an alkyl styrene, isobutylene, isoprene, or butadiene.
26. (Previously presented) The composition of Claim 24 wherein the one or more monomers comprise styrene.
27. (Previously presented) The composition of Claim 24 wherein the free radical initiator is selected from the group consisting of azo initiators and peroxides.
28. (Previously presented) The composition of Claim 24, wherein M is zirconium.
29. (Previously presented) The composition of Claim 24, wherein M is titanium.
- Claims 30-43. (Cancelled).
44. (Previously Presented) A composition comprising the product of a catalyst precursor and at least one monomer, wherein the monomer is polymerizable by free-radical polymerization, and wherein the catalyst precursor is represented by one of the formulas:



wherein

- (a) M and M¹ are titanium;
 - (b) L_A is a substituted cyclopentadienyl or heterocyclopentadienyl ligand connected to M or M¹ wherein L_A comprises R;
 - (c) L_B is a ligand as defined for L_A but selected independently of L_A;
 - (d) T is a bridging group that connects L_A and L_B and comprises a Group-13-to-16 element and 1-2 of R';
 - (e) D and E are the same or different abstractable ligands; and
 - (f) J is a heteroatom ligand comprising a Group-14-15 atom and 0-2 of R",
- wherein R and R' are independently hydrogen or a hydrocarbyl group provided R' comprises at least one unsaturated double bond that can be polymerized by a free radical initiator.

45. (Previously presented) The composition of Claim 44 wherein R and R' are independently hydrogen or a C₁-C₅₀ hydrocarbyl group.

46. (Previously presented) The composition of Claim 44 wherein R and R' are independently hydrogen or a C₁-C₂₀ hydrocarbyl group.
47. (Previously presented) The composition of Claim 44 wherein each R is independently one of hydrogen, allyl, methyl, or a phenyl group.
48. (Previously presented) The composition of Claim 44 wherein the abstractable ligands are independently hydride radicals; hydrocarbyl radicals; or hydrocarbyl-substituted organometalloid radicals.
49. (Previously presented) The composition of Claim 44 wherein two of the abstractable ligands join to form a 3-to-40-atom metallacycle ring.
50. (Previously presented) The composition of Claim 44 wherein the abstractable ligands are independently halogen, alkoxide, aryloxy, amide, or phosphide radicals.
51. (Previously presented) The composition of Claim 44 wherein the abstractable ligands are chloride, bromide, iodide, methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl, hexadecyl, heptadecyl, octadecyl, nonadecyl, eicosyl, heneicosyl, docosyl, tricosyl, tetracosyl, pentacosyl, hexacosyl, heptacosyl, octacosyl, nonacosyl, triacontyl, hydride, phenyl, benzyl, phenethyl, tolyl, methoxy, ethoxy, propoxy, butoxy, dimethylamino, diethylamino, methylethylamino, phenoxy, benzyloxy, allyl, 1,1-dimethyl allyl, 2-carboxymethyl allyl, acetylacetonate, 1,1,1,5,5,5-hexa-fluoroacetylacetonate, 1,1,1-trifluoro-acetylacetonate, or 1,1,1-trifluoro-5,5-di-methylacetylacetonate radicals.
52. (Previously presented) The composition of Claim 44 wherein the free radical initiator is selected from the group consisting of azo initiators and peroxides.

53. (Previously presented) The composition of Claim 44 wherein the free radical initiator is selected from the group consisting of 2,2'-azobis(2-methylpropanenitrile), 1,1-azobis(1-cyclohexanenitrile), 4,4'-azobis(4-cyanovaleric acid), triphenylmethy lazobenzene, di-t-butyl hyponitrite, dicumyl hyponitrite, dibenzoyl peroxide, didodecanoyl peroxide, diacetyl peroxide, diisopropyl ester, dicyclohexyl ester, cumyl hydroperoxide, t-butyl hydroperoxide, dicumyl peroxide, di-t-butyl peroxide, and hydrogen peroxide.
54. (Previously presented) The composition of Claim 44 wherein the at least one monomer comprises styrene, vinyl styrene, an alkyl styrene, isobutylene, isoprene, or butadiene.
55. (Previously presented) The composition of Claim 44 wherein the one or more monomers comprise styrene.
56. (Previously presented) The composition of Claim 23 wherein R and R' are independently hydrogen or a C₁-C₅₀ hydrocarbyl group.
57. (Previously presented) The composition of Claim 23 wherein R and R' are independently hydrogen or a C₁-C₂₀ hydrocarbyl group.
58. (Previously presented) The composition of Claim 23 wherein each R is independently one of hydrogen, allyl, methyl, or a phenyl group.
59. (Previously presented) The composition of Claim 23 wherein the abstractable ligands are independently hydride radicals; hydrocarbyl radicals; or hydrocarbyl-substituted organometalloid radicals.
60. (Previously presented) The composition of Claim 23 wherein two of the abstractable ligands join to form a 3-to-40-atom metallacycle ring.

61. (Previously presented) The composition of Claim 23 wherein the abstractable ligands are independently halogen, alkoxide, aryloxy, amide, or phosphide radicals.
62. (Previously presented) The composition of Claim 23 wherein the abstractable ligands are chloride, bromide, iodide, methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl, hexadecyl, heptadecyl, octadecyl, nonadecyl, eicosyl, heneicosyl, docosyl, tricosyl, tetracosyl, pentacosyl, hexacosyl, heptacosyl, octacosyl, nonacosyl, triacontyl, hydride, phenyl, benzyl, phenethyl, tolyl, methoxy, ethoxy, propoxy, butoxy, dimethylamino, diethylamino, methylethylamino, phenoxy, benzoxy, allyl, 1,1-dimethyl allyl, 2-carboxymethyl allyl, acetylacetonate, 1,1,1,5,5,5-hexa-fluoroacetylacetonate, 1,1,1-trifluoro-acetylacetonate, or 1,1,1-trifluoro-5,5-di-methylacetylacetonate radicals.
63. (Previously presented) The composition of Claim 23 wherein the free radical initiator is selected from the group consisting of azo initiators and peroxides.
64. (Previously presented) The composition of Claim 23 wherein the free radical initiator is selected from the group consisting of 2,2'-azobis(2-methylpropanenitrile), 1,1-azobis(1-cyclohexanenitrile), 4,4'-azobis(4-cyanovaleric acid), triphenylmethy lazobenzene, di-t-butyl hyponitrite, dicumyl hyponitrite, dibenzoyl peroxide, didodecanoyl peroxide, diacetyl peroxide, diisopropyl ester, dicyclohexyl ester, cumyl hydroperoxide, t-butyl hydroperoxide, dicumyl peroxide, di-t-butyl peroxide, and hydrogen peroxide.
65. (Previously presented) The composition of Claim 23 wherein the at least one monomer comprises styrene, vinyl styrene, an alkyl styrene, isobutylene, isoprene, or butadiene.
66. (Previously presented) The composition of Claim 23 wherein the one or more monomers comprise styrene.

Claims 67-78. (Cancelled).